"To promote understanding and appreciation of the religious and spiritual values which abide in the processes and relationships of agriculture and rural life; to define their significance and relate them to the Christian enterprise at home and abroad."

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Man's Moral Obligation to the Earth

By W. C. Lowdermilk

The story of Ben James and his farm in Louisiana which I recently visited, is similar to what has happened to great numbers of our farms. A few years ago, he was a prosperous farmer. He secured a Federal loan of $1000 on his 200 acre farm of gently sloping land. This was excellent security. Ben plowed his fields up and down the slopes so that each furrow was a potential gully. They grew in size -- some 20 feet in depth. Gradually the fertility and topsoil washed off his place, leaving gullies and subsoil exposed. When we visited his farm in January 1935 we found remnants of topsoil on about two acres; all the topsoil over the remainder of the farm had been swept away by accelerated erosion. Moreover, a system of gullies resembling an octopus with its many tentacles, was eating out the heart of the farm. I asked what had become of all the material excavated by this gully system. We followed the train of the eroded material out onto the stream bottoms, being land of neighbors' farms where we found that the formerly fertile bottom lands were covered over with the sterile outwash, in some places three feet deep. But in addition to this, the drainage system had been choked up and the bottom had been transformed from a valuable farm to a willow marsh. The Ben James farm from which had come all this material could not now be sold for $300. The farm is actually a menace to the community. But what of the owner? He was formerly a unit of society who produced more than he needed; accordingly, he was a consumer of the products of other elements in society; he was a contributor to the institutions of his community and state; now he is on the relief rolls at Federal expense.

I shall leave to you to follow the implications indicated by this case, which represents the elements in varying degree of hundreds of thousands of farms throughout the agricultural regions of this country. The effects and interest of this physical crisis in land use brought on by accelerated soil erosion can not be confined to the limits of the eroding farm; they reach to every tax-paying citizen of the United States, and to future well-being of our social order.

Erosion as a geologic process is as old as the first rain storm; it is older than sedimentary rocks. It is therefore necessary for clarity of thinking, in considering problems of soil erosion and its control as it affects the well-being of nations and civilizations, to differentiate between geologic normal erosion and accelerated or man-induced erosion.

Normal erosion, which I term "geologic norms of erosion" has, throughout geological time, carved with master hand the wonders of the Grand

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Canyon of the Colorado and Bryce and Zion Canyons with the leisure of moving glaciers. It has worn through uplifted plains; it has provided material to fill rich alluvial valleys; it has rounded off hills and sculptured landscapes. The benefits have been many because this geologic erosion did not proceed faster than nature formed new soils and a protective cover of vegetation. Thus we may use this geologic norm of erosion responsive to local conditions as a basis for the measurement of what we may call accelerated erosion of soil erosion. Experimental studies have served to measure the degree of acceleration for varied soils, climates, and natural vegetative cover.

The alarming problem confronting thinking people today is that the agricultural occupation of our land has broken the balance of nature and has produced what I term "accelerated or man-induced erosion," which means that the soils are washing away faster than new soils are being formed.

What is this balance of nature and what has man done to destroy it? When the first settlers came to this continent about three hundred years ago, they found the largest and richest tract of land in a state of pristine fecundity ever discovered by any people. The vast resources of oil and forests and rich fertile lands were millions of years in the making. It was not a gift for the exploitation solely by that generation or our generation, but it is a heritage to be used, not misused; to be conserved, not exploited, for it must be the basis for the sustenance of our American civilization for this generation, for 1,000 years, for 10,000 years -- but why limit our occupation of this land? What has happened? We have been here a short time, in the life of a civilization, yet in these few years we have all combined in one continuous frenzy of exploitation, each generation grasping for all that it could get out of the rich contributions of nature, with apparently little realization that we are in danger of making this wonderful land of promise a future land of poverty and impoverishment for the increasing populations of the years to come, whereas we might use such resources wisely and leave them in continued productivity for this and future generations.

The important feature of normal geologic erosion, is that it generally proceeds no faster than soil formation. In other words, soils and a protective vegetation cover are built up at an equal rate with the normal rate of erosion. Development of soil and vegetation has progressed dependently through time, measured in geologic terms. Vegetation has enhanced the accumulation, and has protected the nourishing soils of varying depths, which were the products of intricate processes of soil formation during thousands of years. Thus this coverage of vegetation and its layers of ground litter under pristine conditions, rendered surface wash of soil negligible. It also supplied nutrients for myriads of soil micro-flora and fauna, and for burrowing animals. All this favored the percolation and retention of rain water and moisture rendering maximum control of flood flows and at the same time protected the surface from the erosive action of wind and flowing water. Thus the soils were maintained despite the geologic process of erosion. General soil profile development or differentiation into topsoils and subsoils is the evidence of this fundamental fact.

The same processes which have laid waste and barren much of the lands of Asia Minor and China where civilizations have long inhabited the earth, are rapidly destroying our lands in the United States. We can often trace the rise and fall of civilizations by the use and misuse of their soils. The same processes of the destruction of soils which have contributed to impoverishment and low economic standards in China, will also bring them to us unless we awaken to the menace of this octopus of erosion, which is tearing away the rich, productive soils, carrying them out to the ocean or depositing them to silt up stream beds and our costly reservoirs and irrigation systems,leaving our lands sterile from cancerous gully systems, or reduced in productivity despite all efforts made in improved crop strains, and applications of fertilizers.

Of course man must till the good earth for the production of food and textiles and cut the trees of the forests for homes and comforts. Such necessary use of soils and forests can be done in a manner which will keep them in a continuous condition of productivity, or, man can in a short period so destroy the soils of the mountains and valleys that they are of little use for any kind of production.

We came to this continent as exploiters. There was an abundance of land. We cleared off nature's protective cover. We exposed the rich soils to wind and rains. We destructively cut off or burned off our watersheds without thought of maintaining continuous productivity. We overgrazed our hill lands until there was insufficient vegetation to hold back the soils. On mountain and hill, we broke up the balance of nature for the control of erosion. Farmers tilled the slopes and plowed their fields in such ways that each furrow might become a potential gully. The rich topsoils washed off and left subsoils exposed. Little rivulets rapidly grew into gullies. Gullies have devoured the farms over great areas. Soils were deprived of their natural mantles of protection, and few or no measures to safeguard them from accelerated erosion were taken. Thus the geologic norm of erosion was accelerated at a menacing and dangerous rate for national stability.

This process of land destruction, or suicidal agriculture, has gone on without much attention because there were always new lands to the west to clear and cultivate. Our frontier of new lands

was pushed westward until it dissolved in the waters of the Pacific Ocean and has reappeared under foot. Our new frontier is the conservation of the lands which we now occupy. The President's executive order of November 26, 1934, withdrawing the remainder of the Public Domain from homestead entry, brought to a close an era in American history, an era of land exploitation. Essentially all of our good tillable lands are now occupied, their sustained and safe usage become our frontiers of a new era of conservation in land use.

The lands of the earth are now occupied; there are no new continents to be discovered and colonized. We as a people must consider the making of this continent the home of this civilization. Our methods of use of the soil will determine the well-being of the present, and future standards of living in this land. We may condemn future generations to poverty and low economic standards, or we may assure the present and future generations of sustained soil productivity.

In the final analysis all things are purchased with food. No civilization can endure when the productivity of the land is wasted away. Farming subsoils when productivity has been washed away will produce sub-citizens, whereas productive lands mean continued prosperity and high standards of living.

One of the many experiments in soil erosion show that it would require 6,800 to 12,000 years to wash away 12 inches of surface soil of a Missouri soil when covered with grass, or more than 100,000 years if covered by native sod; whereas, it would require only 29 to 36 years to wash away one foot of soil when clean cultivated to corn on 8 percent slopes. Out of our 365,000,000 acres under cultivation within the United States, approximately 51,000,000 -- or an area the size of Kansas -- have already been destroyed for farming by gullies, leaving vast once-productive areas useless and waste. Besides the gully erosion, the fertility of 125,000,000 acres of our crop producing lands is being destroyed by sheet erosion on the gently sloping lands -- an estimated area the size of the New England states with Pennsylvania added, is being attacked by gully erosion, sheet erosion, and wind erosion. The yearly rains on these ploughed fields, by innumerable rivulets, corrugate the fields so that they shed water as from a tiled roof, carrying not only the rain water, but also the fine top soil. Year after year this has happened. The farmer has again ploughed his fields and covered up these scars, but the loss sustained is shown by the constantly decreasing productivity despite the use of modern methods and expensive fertilizers.

Besides the destruction by water erosion, described at the beginning of this paper, we have had, during the past two weeks, insistent reminders of the devastation caused by wind erosion on an enormous scale, heralded by great dust storms. Clouds of dust were driven into the upper atmosphere, blotted out the sun at midday with a great yellow and ominous pall over the western states to the Gulf of Mexico. Newspapers have carried startling accounts of the necessity of burning street lights during the day, of the blocking of roads with drifted soil, and of blowing soil out of fields down to plow depth. We have entered upon a period of repeated dust storms unless adequate control measures are put into effect or the region abandoned to native vegetation.

Repeated dust storms on such a gigantic scale are fearsome phenomena; man seems helpless to cope with such overwhelming forces of land destruction. It is readily understood why people on first thought may ascribe the repeated occurrences of these foreboding dust storms to unfavorable changes in climate. The contemplation of such a tragic destiny of our western Great Plains would undermine the sustaining hope and confidence of the sturdy and industrious farm folk of this region.

But before we accept the portending destruction to the usefulness of this great area, let us diagnose the situation. Let us examine the nature, action and control of wind erosion. It was my task a few years ago to make a somewhat similar diagnosis in northwestern China, where the decadence of a formerly prosperous and populous region had been ascribed by many students to adverse climatic change. Ruins of magnificent edifices and of elaborate memorial arches now stand in the midst of a sparse population visited by the ravages of drought famine, two and three times a decade. The landscape was barren of vegetation, and eaten away by labyrinths of gullies. But on a field trip into the drainage areas I found temple forests fully stocked with native trees, shrubs, herbs and grasses within the protected precincts of the Temples. This cover of vegetation was a striking contrast to the surrounding bare landscapes. These temple forests demonstrated first, that the present climate of northern China would support a like cover of vegetation on similar localities, if protected, and second, that we must discover how far unwise use of land may contribute to the decadence of a civilization before we ascribe it to adverse climate changes. Climate does change through geologic time, but such changes are very slow in comparison to the changes we noted in China or those we are dealing with in the Great Plains of the United States.

Wind erosion works in a rapid and devasting manner in susceptible areas, much more rapidly than water erosion. A productive farm may be practically ruined in a single dry season of high winds. The sorting of the soil by wind into the larger sand grains which are left behind as hummocks, drifts

and small dunes, and the lifting of the very fine and fertile particles into dust clouds, to be carried beyond the region, prepares for rapid expansion of blow areas. A blow area may thus start on one farm and spread its devastation into other farms to the leeward unless effective control measures are taken.

Prevention of wind erosion is much more economical and safer than correction. The application of coordinated methods involving the basic principles of moisture conservation and the protection of the land surface from the force of high winds with crop stubble and residue and uncut rows of grain, sorghums or sudan grass, until new crops are started, is an assurance for a continuously prosperous region. Let us proceed rapidly to this great task of saving our plains' soils from the caprice of high winds and the country from the shuddering apprehension of overwhelming dust storms. It is possible, furthermore it is necessary, if we are to prevent the encroachment of the desert into prosperous farming areas of the plains.

The greatest enemy to the sustained continuence of our American standards of civilization is not an invasion by an armed foe against which we spend vast sums in preparedness, but soil erosion. This enemy is entrenched within our borders. It must be conquered quickly, or else we will condemn succeeding generations to the low economic standards and poverty that have befallen older nations through wastage of soils by destructive agricultural methods.

The country is tardily becoming conscious of this great menace of soil erosion. For the first time in history, a coordinated attack upon soil wastage is being pushed forward by the Federal government through the demonstrational and educational work of the Soil Conservation Service. The growth of interest is marvelous. It is the clarion of hope to tens of thousands of hopeless and distressed farmers. At present work is being supervised on forty million acres in forty different states.

At last we are beginning to realize that the proper use of the natural resources of this earth is man's moral obligation to posterity. It is a stewardship which each generation must honor.